

## Special Article

## Concentration & Competition In the U.S. Food & Agricultural Industries

The U.S. food and agricultural sector continues to industrialize, and the effects have been particularly evident in the last two decades. Industrialization is associated with a range of structural changes, including larger firm size, specialized production methods, vertical coordination, and concentration—sharp declines in the number of buyers or sellers of a product. In the industrialization process, farms and factories typically become much larger and also more specialized; for example, livestock feeders buy feed instead of growing it, or hire labor instead of providing it themselves. Buyers and sellers of agricultural commodities often change the way they do business, relying less on open spot markets, and more on contractual and administrative methods for buying or selling.

Industrialization creates broad changes far beyond the immediate effects on individual operators. As larger and more specialized producers realize lower production costs and increase production, competition can force cost reductions to be passed through in the form of lower commodity and food prices. For traditional producers whose costs do not fall, incomes are often squeezed as farm prices decline. In addition to greater commodity volumes, larger production units will often generate much larger volumes of waste products (manure, odor, effluents), and existing methods of local pollution control can be overwhelmed by more concentrated waste flows. New production methods brought about by industrialization often lead to important changes in labor forces, transportation, and land use patterns in local communities, with major implications for local public services and local businesses.

Industrialization can also lead to concentration, which may limit competition because concentrated sellers may be able to raise prices charged to buyers, and concentrated buyers may be able to reduce prices they pay to sellers. Reduced competition may in turn limit opportunities for society to gain from industrialization, by limiting the spread of innovations and by tilting the market's results in favor of the players with market power.

Concentration has become a concern in several key agricultural industries linked closely to farmers. For example, recent railroad mergers have left two major carriers serving grain shippers in the West, and the proposed sale of Continental Grain's merchandising business to Cargill will concentrate grain export facilities serving the Gulf Coast. Sharp increases in meat packer concentration may affect livestock producers. And mergers in the seed industry could potentially leave much of the important research and development in biotechnology in the hands of a few companies. But industrialization (i.e., expanding firm size) does not necessarily lead to a reduction in competition, and the structural changes generated by industrialization may have little impact on competition.



National Grain and Feed Association

### *Distinguishing Industrialization From Concentration*

Distinguishing between changes in concentration and broad patterns of industrialization is important because firm size does not necessarily affect how firms compete. Consider the statistics of the U.S. livestock sector. Hog producers large enough to market at least 50,000 animals in a year were virtually unheard of in the 1970's. But by 1988, such very large operations accounted for 7 percent of all hogs marketed, and by 1997 they accounted for over a third of all marketings. The size of slaughter plants has grown along with producer size; plants slaughtering at least 1 million hogs a year handled 24 percent of hog slaughter in 1975, but handled 87 percent by 1996.

Meat packers typically buy cattle from large feedlots (selling at least 16,000 cattle a year); today, a little over 200 large cattle feeders account for more than half of the 28 to 29 million steers and heifers moving to meat packers. Twenty years ago, large feeders accounted for less than 20 percent of marketings. In the mid-1970's, about 13 percent of all fed beef came from plants that slaughtered more than half a million steers and heifers a year; two decades later, these large plants handled almost 80 percent of U.S. fed-beef slaughter.

These statistics reflect industrialization; producers and packers have become larger. In considering the potential effects of indus-

trialization on competition, however, it is necessary to distinguish size from concentration.

Concentration in cattle slaughter has increased dramatically, to levels that in many instances indicate a lessening of competition. In 1980, the four largest slaughter firms handled 36 percent of all steer and heifer slaughter. By 1993, the four-firm concentration ratio (CR4) rose to 80 percent, where it has remained.

But large size does not necessarily imply high concentration. The largest hog producers and cattle feedlots are much larger than they used to be, but there are still hundreds of them. They are not concentrated enough to be able to alter prices. While concentration in the cattle slaughter industry has increased dramatically, concentration in hog slaughter is still not unusually high—CR4 stood at 56 percent in 1998.

Moreover, high concentration doesn't necessarily mean large size. The only supermarket in a small and isolated town likely has more power to raise food prices than does a superstore competing with other large supermarkets in a densely populated metropolitan area.

### ***High Concentration Can Lead To Less Competition...***

In highly concentrated markets, a small number of sellers may be able to avoid competing with one another and may raise prices substantially. Similarly, a small number of buyers may force prices down substantially if they can avoid competing with one another. The following examples illustrate the issues.

The *world market for lysine*, a key ingredient in animal feeds, is dominated by four sellers: the American firm Archer Daniels Midland (ADM), the Japanese firms Ajinomoto and Kyowa, and a Korean producer, Sewon. ADM's entry into the business in 1991 led to a price war, after which the four began to explicitly collude; that is, they agreed to refrain from competing on price and attempted jointly to cut production and raise prices. During the period of collusion, the conspiring firms were able to raise prices by 50-100 percent compared with periods when they were not colluding.

Three major producers dominate the *U.S. market for infant formula*, and over half of formula purchases is financed through USDA's Supplemental Nutrition Program for Women, Infants, and Children (WIC). In 1989, Congress demanded implementation of measures to contain WIC infant formula costs. One measure was sole-source contracts awarded on the basis of competitive bids, under which the firm offering the lowest net price (wholesale price minus a rebate to state WIC agencies) would be awarded exclusive rights to all WIC sales in a state. State WIC agencies would then bill the manufacturer for rebates on all WIC voucher purchases of formula at authorized outlets.

The sole-source contracts introduced competition into a highly concentrated market. On average, formula makers charged a wholesale price of \$2.48 cents a can to retailers in 1996. Non-

WIC households paid the wholesale price, plus the retail markup. The WIC program received an average manufacturer rebate of \$2.10 cents a can, thus paying a net wholesale price of 38 cents a can (85 percent below the non-WIC price), plus the retail markup. Because WIC and non-WIC products and marketing channels are identical, there are no relevant cost differences between the two markets. The enormous size of the rebates strongly suggests that these manufacturers have significant power to raise prices above costs, and that they had significant market power in WIC markets before the buying reforms were introduced.

*Railroad mergers* in the 1990's reduced the number of western railroads from four to two. Analyses by USDA's Economic Research Service indicate that rail rates for hauling grain rise as the number of railroads declines, and that carrier consolidation would likely increase rates by 10-20 percent. USDA expressed reservations about the first merger (between Burlington Northern and Atchison, Topeka, and Sante Fe) and opposed the second (between the Union Pacific and Southern Pacific). The U.S. Department of Justice also opposed the second merger, but the Surface Transportation Board, which has jurisdiction over rail mergers, approved both mergers.

USDA and cattle producers have repeatedly expressed concern over high concentration in *cattle slaughter*, particularly in steers and heifers, where three firms (IBP, Cargill, and Conagra) dominate the industry. High concentration may result in lower prices paid to producers for cattle and higher retail prices paid by consumers for meat. But academic and government researchers have not found evidence of substantial price effects from high concentration in meat packing. Estimates of cattle price effects from concentration range from zero to a 4-percent decline. Moreover, the largest effects occur outside the Great Plains (though the biggest packers' major plants are in that region).

### ***.... But Does Not Always Reduce Competition***

Why should the price effects of concentration vary so much across markets? It is because concentration limits competition when it combines unfavorably with other factors, such as the nature of substitutes for the commodity subject to high concentration, the ease of entry into the market, and the nature of rivalry among existing firms in the market.

Consider the nature of substitutes, using rail transport as an example. Trucks and barges are workable substitutes for rail for some commodities and on some routes. For grain shippers, trucks are good substitutes on short hauls, and barges are good substitutes near the Mississippi and Missouri rivers; in those regions, rising railroad concentration has little effect on rates, because shippers can easily shift to competing modes. Increased rail concentration can have important rate effects where there are few good substitutes, such as on long-haul shipments from the Western Plains, far from large navigable rivers.

Now consider entry barriers. Entry into railroading is exceptionally risky—a carrier must commit a significant investment to trackage and rolling stock, and the trackage really has no

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**Ease of Market Entry Can Limit Price Effects Of Concentration**

Market characteristics	Market			
	Lysine	Infant formula	Western railroads	Cattle slaughter
Number of dominant firms	4	3	2	3
Price effects of concentration	50-100%	600%	10-20%	0-4%
Ease of market entry	Hard	Hard	Very hard	Easy
Product/service substitutes	Limited	Limited	Limited in places	Limited
Buyer/seller response to price changes	Quick	Slow	Quick	Quick

Source: Compiled from academic, government, and industry studies. Economic Research Service, USDA

secondhand market (except as scrap). Because of that risk, the only major railroad entry in the last 50 years was the 1980's expansion by Chicago and Northwestern into the highly profitable coalfields in Wyoming's Powder River basin.

Entry into the markets for lysine and infant formula, while not as difficult as railroading, is nevertheless quite risky. Because one efficient plant can account for a significant share of the market (e.g., ADM's one plant produces half of U.S. lysine sales), any entrant must recognize that one additional entry could bring prices down substantially, causing losses for the entrant. Moreover, production in each market involves specialized know-how, so that new entrants could find themselves at a serious cost disadvantage compared with incumbents.

On the other hand, there are fewer barriers to entry in cattle slaughter. A new slaughter plant, while large and expensive, would still account for only 5 percent of industry sales. Because a single new entrant would not have the potential effect on prices as in the other examples, entry is less risky. Moreover, production processes in meat packing are relatively simple, without the complex pieces of capital equipment and without the trade secrets found in the other examples. All in all, entry is easier in meat packing, and existing firms with large market share should therefore exert weaker effects on prices.

Finally, consider rivalry among existing players, which in turn depends greatly on how buyers (or cattle sellers in the case of meat packing) react to changes in the prices offered by concentrated firms. Many parents in the non-WIC infant formula market rely on physicians' recommendations of specific brands. This strong brand loyalty means that formula buyers are unlikely to respond rapidly to a price cut by a seller; formula sellers therefore have weak incentives to cut prices, resulting in little price competition. By contrast, buyers in the WIC market (i.e., state agencies) respond dramatically to price cuts: if a formula seller cuts price below other brands, it gets all WIC sales in a state, while if it raises prices above others, it loses all of a state's WIC sales. Because WIC buyers react so strongly to price changes, formula sellers have strong incentives to compete on price.

Buyers in lysine and railroad markets (elevators, feed companies, grain merchants) also have the expertise to compare alternative offers and have strong incentives to seek lower prices for the large volumes they buy. They will often be quite responsive to individual price cuts, and rival sellers have strong incentives to compete on prices. Indeed, lysine sellers colluded as a way to reduce price competition that continually broke out among them.

Because the cattle market is concentrated on the buying side, the issue concerns the responsiveness of cattle sellers to price offers made by concentrated buyers, and the consequent incentives for buyers to compete on price. USDA identified 19,395 separate sellers in a survey of 1992 cattle purchases by large steer and heifer slaughter plants. Only 300 of those sellers were large feedlots (each selling at least 16,000 head of cattle that year). But large feedlots accounted for over 70 percent of all cattle sold, and averaged nearly 400 transactions annually; that is, large feedlots sell a lot of cattle and are in the market frequently. They should have the incentive and the market expertise to react quickly to price differences among cattle buyers, and consequently major meat packers should face strong incentives to compete actively on price.

Most cattle sellers (89 percent) in the 1992 USDA survey were small farmer-feedlots. On average, small feedlots sold less than 200 cattle each to the largest packing plants during the year, in just two to three transactions, and together accounted for only 14 percent of all cattle sold to the plants. Those sellers could be less able to react to price cuts by packers, and packers could have opportunities to cut cattle price offers to smaller feedlots.

The few large meat packers appear to compete aggressively among themselves for cattle, because entry barriers are low and sellers react strongly to price competition. That does not mean that meat packers will always compete; competitive struggles among the firms in highly concentrated industries sometimes abate over time as they come to know each other's strategies better. Nor does it mean that meat packers compete aggressively on every cattle purchase or that there may not be some anticompetitive behavior; they may possess localized market power over some classes of sellers and in some locations. But during 1992-93, after a dramatic period of growing concentration in the 1980's and early 1990's, the meat packing industry had not shown the broad evidence of market power that is so evident in some other sectors. Therefore, based on available information, it appears unlikely that efforts to reduce concentration in meat packing would have substantive effects on cattle prices.

***Federal Policies Target Competition, Not Concentration***

Federal competition policies generally address those markets in which firms may be able to exercise market power. For example, merger statutes call for restrictions on mergers that may tend to create monopoly or otherwise restrict competition. The Department of Justice, the Federal Trade Commission, and Federal courts focus on mergers in highly concentrated markets where the products or services have few substitutes, where the industry has barriers to entry, and where there are other factors likely to

limit competition. Antitrust policy on trade practices focuses on actions—frequently related to marketing strategies and trade announcements—that serve principally to deter entry or to extend a dominant firm’s market power without having any overriding business benefits.

Under U.S. statutes, explicit coordination of pricing and other economic decisions by rival firms is illegal and subject to criminal penalties, even if such collusion is unsuccessful in altering prices. As a result, enforcement often emphasizes evidence of meetings and written, oral, or electronic communications among rivals. But firms are more likely to attempt to collude in markets where collusion might successfully lead to price changes, where concentration is at least moderately high, and where some other conditions conducive to market power (entry barriers, limited substitution, and ability to curtail production) are present.

Antitrust law can restrict actions that are anticompetitive, such as collusion or a specific merger, but it cannot direct firms to take procompetitive actions. Antitrust enforcement rarely focuses directly on independent pricing decisions taken by firms (e.g., deciding without collaboration to refrain from price competition). In the case of the lysine conspirators, antitrust laws were involved because conspiracy among firms could be identified and deterred through fines and criminal penalties. The antitrust laws could have been used against railroad mergers, where prohibiting a merger may have preserved greater competition. Where manufacturers independently refrain from competing with one another, some evidence of collusion or concerted inaction would generally be required.

Antitrust law is not the only policy tool for affecting competition. Some industries, meat packing for example, are subject to extensive Federal regulation, and unfair or deceptive trade practices by meat packers that may not be considered violations of the antitrust laws may violate the Packers and Stockyards Act. In addition, USDA procurement policies have direct effects on competition among makers of infant formula because USDA is a major buyer and because existing industry conditions (high concentration, entry barriers, and brand loyalty) create extraordinary potential for sellers to exercise market power. Aggressive procurement strategies will have much weaker effects on purchase prices in markets that are more competitive than infant formula.

Patent policies can also affect competition. A patent provides the holder with the exclusive right to produce and market a new commercial product for a specified period of time. Patent policy attempts to induce greater competition among would-be innovators by limiting entry of competitors into the newly created market. Instruments of patent policy, including the breadth of the

patent, length of the patent life, and the information that must be disclosed in order to obtain a patent, tailor the terms of that tradeoff between competition in innovation and competition in later production.

With each of these policy tools, concentration matters only to the extent that it affects competition. Moreover, policies do not proceed under the assumption that reductions in the number of competitors automatically reduces competition. In each case, great emphasis is placed on understanding the conditions under which reductions in competitors and increases in concentration will lead to changes in market power and the ability to influence prices.

### ***Competition Not Always an Issue In Industrialization***

Many food and agricultural industries are undergoing broad structural changes, and the general trend is toward fewer but larger producers. In some markets, structural changes have led to high concentration and significant market power, and in some of those cases, Federal competition policies can counteract market power without losing the economic advantages that industrialization brings.

Industrialization also raises issues that have little to do with market power or competition. Industrialization may overwhelm existing environmental controls, create intense new stresses on local public services, undermine the incomes of producers using more traditional production methods, and change rural communities. Competition policies are not designed to deal with these issues; indeed, competition may even intensify those stresses. For example, if large confinement feeding operations grow out animals at lower costs than traditional operations, then the more competitive the industry, and the more rapidly production shifts to large operations. If large operations generate greater localized volumes of wastes, greater competition will also lead to earlier and more intense environmental problems.

Industrialization and structural change sometimes limit competition. But their broader effects more often reflect competition while frequently undermining traditional methods of production, environmental control, and public service delivery. The challenge for policy makers is to identify which of industrialization’s effects should be constrained, and to design instruments that can reach those policy goals. **AO**

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